(a) magnetic source imaging means including means for identifying the location, within the user's brain, of [detecting means for detecting] said one or more stimuli caused by [sensed from] said one or more thoughts to produce one or more detected stimuli,

(b) selecting means for receiving one or more of said detected stimuli to perform a function and selecting a correspondence to one or more user thoughts to produce a selected function and wherein said selecting means does not require an articulated response from the user and does not require the user to manipulate any user controls,

(c) identification means for identifying one or more said detected stimuli as corresponding to said selected function for producing a function control signal,

(d) receiving means for receiving said function control signal for said controlling said computer operation.

REMARKS

Claims 1-36 and 38-66 remain in this application with Claims 1 and 55 having been amended, and Claim 37 having been canceled, to expedite the prosecution of this application. Claims 2-36, 38-54 and 56-66 have not been amended and are believed to be patentable for the reasons set forth below.

Applicant is appreciative of the courtesies extended to Ed Moll and the undersigned by Examiner Tweel during a personal interview on January 25, 1999. During that interview, the Examiner suggested amending Claims 1 and 55 to specify more detail about the input property, namely the stimuli input means. Applicant has thus amended Claims 1 and 55 to specify such detail.

The Examiner has rejected Claims 1 and 55 under 35 U.S.C. §112, first paragraph as containing subject matter not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. In particular, the Examiner asserts that:

> The Summary of the applicant's specification details the primary mode disclosed accomplishes its purpose by accepting Magnetic Source Imaging (MSI) findings of the human body and applying these findings to the control of other devices. These wave patterns, the specification states, of specific body or brain locations are recorded along with the thoughts that produced them. The description continues in that auxiliary systems provide means for contributing alternate or additional inputs to the thought controlled system, and among these are environmental conditions, acoustic conditions, EEG monitoring, eyeball movement or movement of other body parts. All these auxiliary systems as well as the MSI apparatus are to be found in the prior art cited in previous Office actions.
>
> However, according to the claims and the arguments enclosed in the attached amendments, the apparatus is controlled based on stimuli sensed from at least one user thought. The applicant's arguments detail that the primary reference applied, **Junker**, is basically an improvement on biofeedback, which is limited to interpreting frequency spectra detected on the body. It is upheld that presently, science does not know exactly how these spectra are related to <u>thoughts</u>. Therein lies the problem with the applicant's logic. The Applicant through their representative continually argues that the disclosed invention teaches an apparatus that detects at least one stimulus being caused by at least one thought of the user and that; furthermore, science does not know how these prior art devices relate to thoughts. However, the disclosure of the invention details a method that uses several prior art devices (MSI, EEG, eyeball movement) that are well known in said prior art. How can a system based on so many prior art devices be so drastically different and novel over that prior art? To say that a device is new and obvious over prior art devices and, in the disclosure, cite many well known prior art devices does not seem to make much sense.

> Moreover, all prior art devices do indeed observe and record different physiological conditions associated with different moods and, by logical extension, the thoughts that produced them. Furthermore, no two brains are exactly alike. Does that mean that the apparatus has to "learn" the thoughts before the computer is fully operational? To say that the apparatus uses "thoughts" and thought alone to control the computer or on-screen characters and the like without some extension or elaboration on the prior art foundation appears to be science fiction based rather on an enabling disclosure. The following prior art rejection, taken from a previous Office action is based on said prior art references. (pp. 2-4, Office Action).

Applicant respectfully disagrees for the following reasons.

Applicant's invention is directed to a thought-controlled system, i.e., the user's at least one stimuli will be communicated to a device, preferably a computer, that will be used by the computer to accomplish any number of tasks: printing a document, retrieving a file, displaying a graphic on the display screen, etc. *without requiring the user to manipulate any user controls* such as a pointer, cursor, slider bar(s), etc. Therefore, there has to be some means for conveying the user's at least one stimuli to the computer. This is accomplished by use of conventional, prior art input devices, e.g., stimuli input means such as MSI and EEG monitoring, as well as eyeball movement sensors or sensors for detecting movement of other body parts. It is preferable to use MSI (magnetic source imaging) since MSI includes means for identifying the location, within the user's brain, of the stimuli. The importance of such "localization" is stated in the present application:

> Localization, identifying location of stimulus source, is applied when the geometry of the body is known (Ref. US Patent #5,313,944 by Crowley et al.). Head position and intrabrain sector dimensions of each user are made available in a data base. TCS automatically adapts to head position variations for localization accuracy when the user's head is moved slightly. Adaptation of localization to different head positions is accomplished by comparing the actual head position with the data base position to create a virtual head position. Indexing head position is by identifying the location of specific stimuli or by identifying the location of detectable attachments of the

head. Visual image displays of stimuli area are available as covered later. The capability and precedence for this is evidenced as "...priori information about anatomical or physiological constraints should be used to confine the solution" and "...method includes the reconstruction of focal activities..." Ref. W. Moshage, S. Achenbach, K. Gohl, W. Harer, S. Schneider and K. Bachmann MAGNETOCARDIOGRAPHY IN COMBINATION WITH MRI: VERIFICATION OF LOCALIZATION ACCURACY WITH A NONMAGNETIC PACING CATHETER, 1992 Elsevier Science Publishers B.V. and Ref. R. Graumann, K. Abraham-Fuchs, W. Moshage and S. Schneider, RECONSTRUCTION OF CURRENT DENSITIES WITH ANATOMICAL CONSTRAINTS, 1992 Elsevier Science Publishers B.V., Biomagnetism: Clinical aspects. M. Hoke et al. editors, and earlier (Pg. 4) Ref. to W. Moshage, S. Achenbach, A. Weikl. The use of spatially separated multiple channels is most helpful in localization for enabling a stimulus reading to be made from different angles. See earlier (Pg. 3) Ref. to W. Moshage, S. Achenbach. Statistical source distributions and source localization aid in identifying and correcting inadvertent or unexplained stimuli detection. (present application, p. 24, lines 1-22 to p. 25, lines 1-2).

Initially, the state of the art may dictate that reliable control signals will be restricted to particular areas of the body or brain, rather than specific thoughts within these areas. (present application, p. 16, lines 21-22).

...The TCS explores brain activity and localization as well as enable correlation of stimuli with subjects' thoughts and feelings. (present application, p. 17, lines 18-19).

MSI has the ability to pinpoint spatial distribution of a magnetic field or stimulus. Used to display a visual image of the source location, it may assist the user in relating thought patterns to results obtained. MSI is noninvasive and can utilize stimuli from internal parts of the brain remote from the surface. This is more advantageous than EEG and EKG requiring surface electrodes or methods requiring invasive procedures. (present application, p. 17, lines 4-8).

Helmet mounted SQUIDs, or an improvement thereon, will provide better localization accuracy and user mobility as technology advances. The helmet may have a small optical fiber cable connected to the user's chair or bed where signals are converted to higher outputs and forwarded to the main system. Some electronics today are proving that cryogenic cooling may not be necessary. The helmet itself may be used inside a shielded room, or the helmet could be used instead of a shielded room. Ultimately, a wireless system may be explored as technology grows. (present application, p. 43, lines 24-30).

Once the output from the MSI are transmitted to the computer, the TCS software begins to create a database that stores various brain activity (at least one stimuli) which is then associated with a designation. For example, the computer may display a label, or an image, e.g., the phrase "print a document", or a graphical depiction of a printer may be displayed on the screen. The user then consciously thinks that "he/she wants to print a document". The MSI then detects those stimuli from the brain that are active when the user consciously thinks about printing the document. After doing this association a few times for verification, the computer now has a reliable correspondence of the at least one stimuli with the command "print a document." Thus, whenever, the particular user is connected to the MSI and thinks of "printing a document", her/his brain will generate the at least one stimuli that will be detected by the MSI and transmitted to the TCS. The TCS software will then recognize the particular stimuli as "print the document" and the TCS will respond by printing the document. This methodology is stated in the Specification of the present invention:

> Wave patterns of specific body or brain locations are recorded along with the thoughts that produced them. By storing a description of these patterns in a data base, they may be retrieved for comparison and recognition and used to control a target device or system. Thus, predetermined computer operations can be selected and executed as a result of thinking 'controlling' thoughts. (present application, p. 16, lines 16-20).
>
> "...specific thoughts and desires may be reliably detected by TCS such that a greater number of stimuli may be employed by the user. (present application, p. 17, lines 2-3).
>
> TCS stores a history of the system operation, stimuli evaluation criteria, stimuli selection criteria... (present application, p. 17, lines 9-10).

To implement this methodology, the Specification provides the following enabling disclosure:

> Referring to the drawing, Fig. 3 shows the basic elements of handling body stimuli from detection 302 through to computer operation 301. Detection 302 and conditioning 303 perform the stimuli detection and stimuli conditioning described for Fig. 1 SDC 101 to produce conditioned stimuli. This performance is considered successful when conditioning 303 output conforms to the criteria of earlier described stimuli selection 204.
>
> All successfully conditioned stimuli are retained, recorded, and tagged. Each tagged conditioned stimulus is communicated to the user for consideration and correlation with the user's perception of the stimulus origin. With TCS' help, the user inputs an appropriate designation into designation 305. User selection of conditioned stimuli is described earlier in stimuli selection 204 and function designation 205. Note that not necessarily all tagged conditioned stimuli are given user designations. As computer operation functions are needed, a function is assigned to an appropriately designated stimulus or group of stimuli and recorded in related profile within function selection 304.
>
> Accordingly, progressive steps are taken toward assigning a conditioned stimulus to an operational function and recording them in stimulus profiles. During TCS operation, identification 306 compares each conditioned stimulus outputted from conditioning 303 with the conditioned stimuli in the profiles of function selection 304. When identification 306 finds a match, the associated function is sent via function control 307 to computer operation 301. (present application, p. 40, lines 19 - p. 41, lines 1-15).

While any digital encoding and decoding process can be implemented using a general purpose computer, the preferred embodiment of the invention may be a hardware configuration as shown in Fig. 1. To be sure, the hardware could be implemented in a microprocessor or, by use of the LSI, in one or more integrated circuit chips but the circuit diagram would remain essentially as represented in Figs. 1 along with many of the elements in Fig. 2. (present application, p. 22, lines 11-16).

The SDC 101 detects and conditions this stimuli by including, but not limiting SDC 101 to, amplification, filtering, shaping, noise reduction, focal accuracy, localization accuracy, etc. (present invention, p. 19, lines 20-22).

A mouse simulator 202 is used in the TCC 100 to condition the inputs of SDC 101 data. This produces a format compatible with most personal computer input handling for optimum human factors. The TCC 100 then treats the signals similar to the way a computer treats signals from a mouse to initiate activity and cause feedback on monitor 102. Simulators are well known in the art and can be a simple look-up table or a complex array of indirect addresses as required. The concept is that each predesignated stimuli from SDC 101 will cause an input to the TCC 100 which will point to a memory location(s) which performs the same function as if striking a keyboard key, pressing a mouse key, moving the cursor, or other functions as become useful to the user. (present application, p. 22, line 11 to p. 23, line 3).

The interface between TCC 100 and SDC 101 is typical of personal computer interface circuitry such as a parallel transfer, or bus transfer. (present application, p. 20, lines 5-7).

The monitor 102 initially displays a visual communication to the user... (present application, p. 20, line 8).

The use of spatially separated multiple channels is most helpful in localization for enabling a stimulus reading to be made from different angles. (present application, p. 24, lines 21-22).

SDC 101 may be directed to specific sections of the brain by TCC 100 to avoid misreading unwanted stimuli... (present application, p. 25, lines 3-4).

Additional short term history and user statistical information is obtained from the data base to augment stimulus information for optimum interpretation of user's desires. (present application, p. 26, lines 5-7).

Based on all of the above, Applicant respectfully submits that the Specification does enable someone skilled in the art to make and use the present invention as specified in amended Claims 1 and 55. The fact that many of the components of the present invention utilize conventional devices, e.g., MSI (and including EEG monitoring, eyeball movement detection, etc.), as well as conventional computer platforms, does not detract from the patentable features of the present invention: obtaining user stimuli, associating particular

commands to control the computer without requiring the user to: (1) articulate a response (i.e., speak); and (2) manipulate any user control such as a keyboard, mouse, joystick, pointer, cursor, slider bar(s), etc. When Applicant stated in the August 26, 1998 response that "Presently, science does not know exactly how these spectra [i.e., concerning frequency spectra discussed in Junker] are related to thoughts," Applicant was stating the current state of the art: no one has related those spectra to thoughts. On the other hand, Applicant's invention *relates a user's stimuli to particular user thoughts*, i.e., a specific computer command thought by the user will produce specific stimuli that will be detected by the computer via the MSI, verified by the user by display on the screen, and stored in the data base. From then on, every time the computer detects that specific stimuli from the user, the desired computer command (thought of the user) is implemented. Thus, Applicant respectfully submits that the present application does meet the requirements of 35 U.S.C. §112, first paragraph and requests that this rejection of Claims 1 and 55 be withdrawn.

The Examiner has rejected Claims 1, 3-5, 7-17, 19-22, 24, 32-40, 46-48, 51-63, 65 and 66 under 35 U.S.C. §102(b) as being anticipated by Junker. In particular, the Examiner repeated the specifics of the §102(b) rejection as set forth in the Office Action dated December 2, 1997.

Applicant respectfully disagrees for the following reasons.

First, as amended, Claims 1 and 55 now specify that the user is *not* required to manipulate any user control (e.g., keyboard, mouse, joystick, cursor, pointer, slider bar(s), etc.) to control the computer, as is required in the Junker device (see Figs. 8-13). In particular, Junker discloses a system that permits the user to control the computer, or external device, by having the user manipulate the display screen control, i.e., control the cursor, pointer, or slider bar up/down and right/left using his/her EEG/EMG biopotentials. In other words, *the Junker device allows the user to control the graphical user interface by controlling movement of the cursor/pointer/slider bar*. However, Junker does not disclose, nor teach nor suggest controlling the computer, or external device, by *by-passing the display screen controls and providing a complex command to the operating system*, i.e., "print a file," "save a document", "move to a new application program," etc., as does the present invention. In other words, the present invention permits the user to convey an unlimited number of control commands to the computer/external device without the need to use the conventional pointer/cursor/slider bar mechanisms.

Second, Junker does not disclose a function selection means as claimed. In particular, Junker does not disclose a function selection means that comprises a memory *including a correspondence between a plurality of previously-stored user stimuli and a plurality of function control signals*. In other words, Junker does not disclose the feature of associating a plurality of previously-stored user stimuli and a plurality of function control signals.

Third, Junker does not disclose an identification means as claimed. In particular, Junker does not disclose a *means for comparing the at least one stimulus to the correspondence to identify a function control signal that corresponds to the at least one stimulus and thereby issue a function control signal to the computer operating system*.

Thus, for all of the above reasons, Applicant respectfully submits that Claims 1 and 55, as amended, overcome the art of record and respectfully requests that the §102(b) rejection be withdrawn.

Claim 3 is dependent upon Claim 1 and is patentable for the same reasons.

Claim 4 is dependent upon Claim 1 and is patentable for the same reasons and for the additional reasons set forth in the Applicant's previous March 17, 1998 response.

Claim 5 is dependent upon Claim 4 and is patentable for the same reasons.

Claim 7 is dependent upon Claim 4 and is patentable for the same reasons.

Claim 8 is dependent upon Claim 4 and is patentable for the same reasons.

Claim 9 is dependent upon Claim 1 and is patentable for the same reasons and for the additional reasons set forth in the Applicant's previous March 17, 1998 response.

Claim 10 is dependent upon Claim 9 and is patentable for the same reasons and for the additional reasons set forth in the Applicant's previous March 17, 1998 response.

Claim 11 is dependent upon Claim 9 and is patentable for the same reasons.

Claim 12 is dependent upon Claim 1 and is patentable for the same reasons and for the additional reasons set forth in the Applicant's previous March 17, 1998 response.

Claim 13 is dependent upon Claim 12 and is patentable for the same reasons.

Claim 14 is dependent upon Claim 13 and is patentable for the same reasons and for the additional reasons set forth in the Applicant's previous March 17, 1998 response.

Claim 15 is dependent upon Claim 1 and is patentable for the same reasons.

Claim 16 is dependent upon Claim 1 and is patentable for the same reasons and for the additional reasons set forth in the Applicant's previous March 17, 1998 response.

Claim 17 is dependent upon Claim 1 and is patentable for the same reasons.

Claim 19 is dependent upon Claim 1 and is patentable for the same reasons.

Claim 20 is dependent upon Claim 3 and is patentable for the same reasons.

Claim 21 is dependent upon Claim 1 and is patentable for the same reasons.

Claim 22 is dependent upon Claim 21 and is patentable for the same reasons.

Claim 24 is dependent upon Claim 1 and is patentable for the same reasons.

Claim 32 is dependent upon Claim 9 and is patentable for the same reasons.

Claim 33 is dependent upon Claim 11 and is patentable for the same reasons.

Claim 34 is dependent upon Claim 9 and is patentable for the same reasons.

Claim 35 is dependent upon Claim 34 and is patentable for the same reasons and for the additional reasons set forth in the Applicant's previous March 17, 1998 response.

Claim 36 is dependent upon Claim 11 and is patentable for the same reasons.

Claim 38 is dependent upon Claim 1 and is patentable for the same reasons.

Claim 39 is dependent upon Claim 1 and is patentable for the same reasons and for the additional reasons set forth in the Applicant's previous March 17, 1998 response.

Claim 40 is dependent upon Claim 1 and is patentable for the same reasons and for the additional reasons set forth in the Applicant's previous March 17, 1998 response.

Claim 46 is dependent upon Claim 1 and is patentable for the same reasons and for the additional reasons set forth in the Applicant's previous March 17, 1998 response.

Claim 47 is dependent upon Claim 46 and is patentable for the same reasons.

Claim 48 is dependent upon Claim 46 and is patentable for the same reasons and for the additional reasons set forth in the Applicant's previous March 17, 1998 response.

Claim 51 is dependent upon Claim 1 and is patentable for the same reasons and for the additional reasons set forth in the Applicant's previous March 17, 1998 response.

Claim 52 is dependent upon Claim 1 and is patentable for the same reasons and for the additional reasons set forth in the Applicant's previous March 17, 1998 response.

Claim 53 is dependent upon Claim 52 and is patentable for the same reasons and for the additional reasons set forth in the Applicant's previous March 17, 1998 response.

Claim 54 is dependent upon Claim 1 and is patentable for the same reasons.

Claim 56 is dependent upon Claim 55 and is patentable for the same reasons.

Claim 57 is dependent upon Claim 56 and is patentable for the same reasons.

Claim 58 is dependent upon Claim 57 and is patentable for the same reasons and for the additional reasons set forth in the Applicant's previous March 17, 1998 response.

Claim 59 is dependent upon Claim 58 and is patentable for the same reasons.

Claim 60 is dependent upon Claim 56 and is patentable for the same reasons.

Claim 61 is dependent upon Claim 56 and is patentable for the same reasons.

Claim 62 is dependent upon Claim 56 and is patentable for the same reasons.

Claim 63 is dependent upon Claim 1 and is patentable for the same reasons.

Claim 65 is dependent upon Claim 1 and is patentable for the same reasons.

Claim 66 is dependent upon Claim 1 and is patentable for the same reasons.

The Examiner has rejected Claim 2 under §103 as being unpatentable over the combination of Junker and Thatte. In particular, the Examiner repeated the specifics of the §103(a) rejection as set forth in the Office Action dated December 2, 1997.

Applicant respectfully disagrees for the same reasons that Claim 1 is patentable over Junker and for the reasons set forth in the Applicant's previous March 17, 1998 response.

The Examiner has rejected Claim 18 under §103 as being unpatentable over the combination of Junker and Hartzell. In particular, the Examiner repeated the specifics of the §103(a) rejection as set forth in the Office Action dated December 2, 1997.

Applicant respectfully disagrees for the same reasons that Claim 1 is patentable over Junker and for the reasons set forth in Applicant's previous March 17, 1998 response.

The Examiner has rejected Claims 6, 23, 25-31, 49, 50 and 64 under §103 as being unpatentable over Junker and Gould. In particular, the Examiner repeated the specifics of the §103(a) rejection as set forth in the Office Action dated December 2, 1997.

Applicant respectfully disagrees with the rejection of Claim 6 for the same reasons regarding the patentability of Claim 4 since Claim 6 is dependent upon Claim 4.

With respect to Applicant's claims concerning artificial intelligence, namely Claims 23, 25-31 and 49-50, Applicant re-asserts the arguments set forth in Applicant's previous August 26, 1998 response. Thus, for all of these reasons, Applicant respectfully submits that Claims 23, 25-31 and 49-50 are patentable over the art of record.

Claim 64 is dependent upon Claim 23 and is patentable for the same reasons.

The Examiner has rejected Claims 42-45 under §103 as being unpatentable over the combination of Junker and Adachi. In particular, the Examiner repeated the specifics of the §103(a) rejection as set forth in the Office Action dated December 2, 1997.

Applicant respectfully disagrees for the same reasons that Claim 1 is patentable over Junker and for the reasons set forth in Applicant's previous March 17, 1998 response.

The Applicant is mindful of the requirement to submit formal acceptable drawings and will do so upon the indication of allowability of this case.

In view of the foregoing amendments and remarks, it is respectfully submitted that Claims 1-36 and 38-66 now appearing in this application are allowable and such favorable action is respectfully requested.

Respectfully submitted,

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